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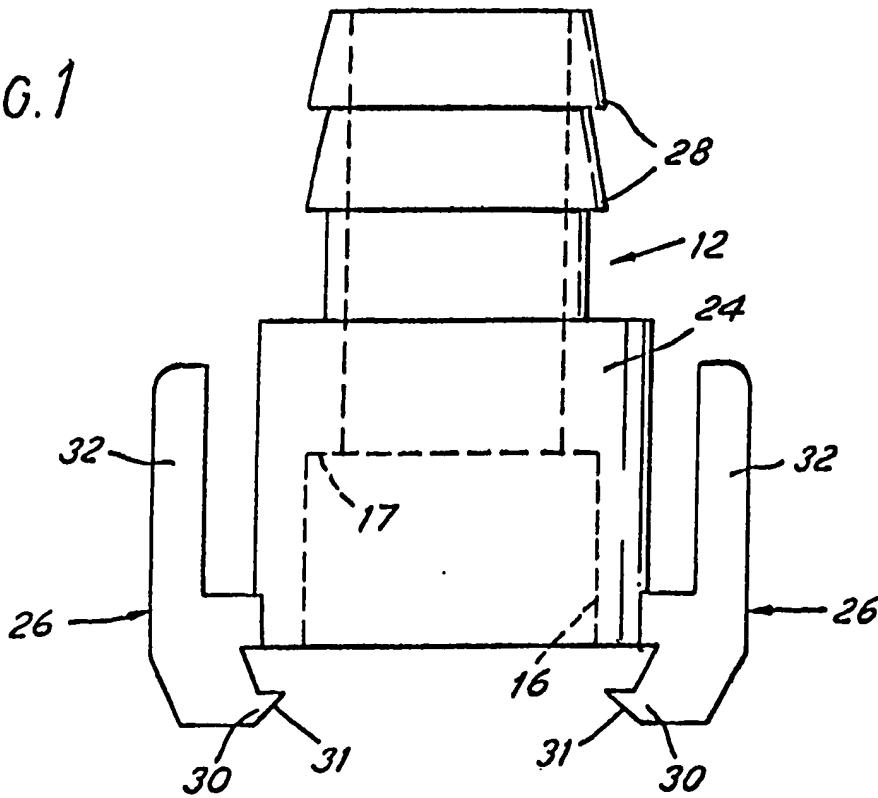
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## (54) A tube connector

(57) A tube connector consists of a male and a female element, each being moulded from synthetic plastics material. Each element has peripheral ridges or a plain cylindrical surface whereby each may be thrust into and retained in an open end of a tube by the gripping action of the ridges or by the friction of the cylindrical surface

on the interior of the tube wall. The female element has a pair of sprung catches 26 at opposite ends of a diameter which are positioned and arranged to spring outwardly to allow entry of the male element 10 and then spring inwardly to securely retain the male element in the female element by engagement of the catches 26 with a radially projecting rim 18 on the male element 10.

FIG. 1



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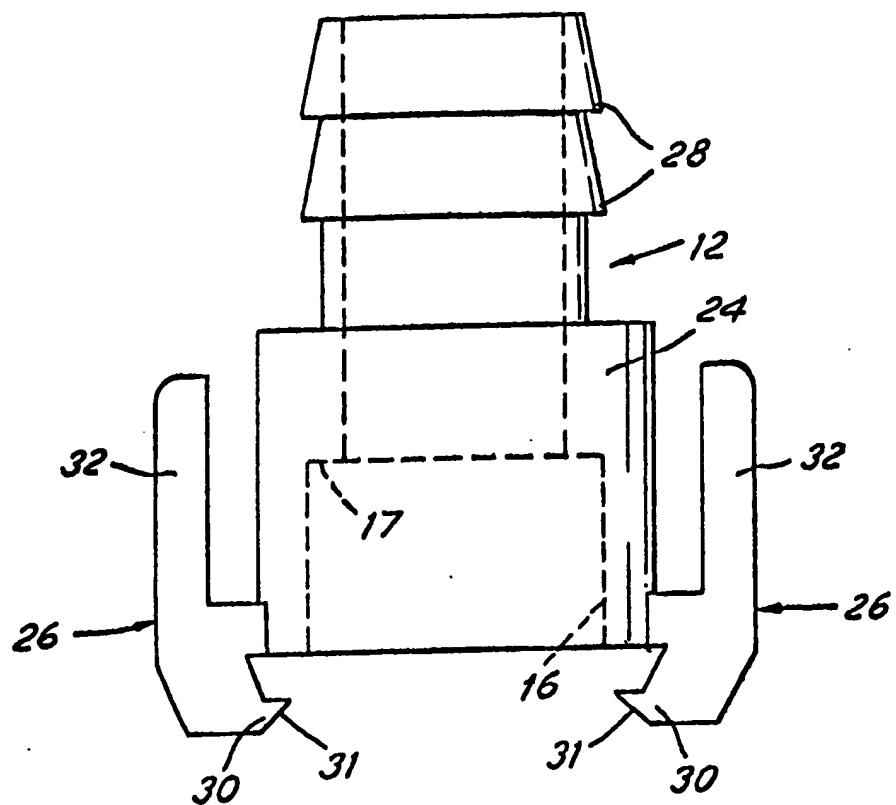
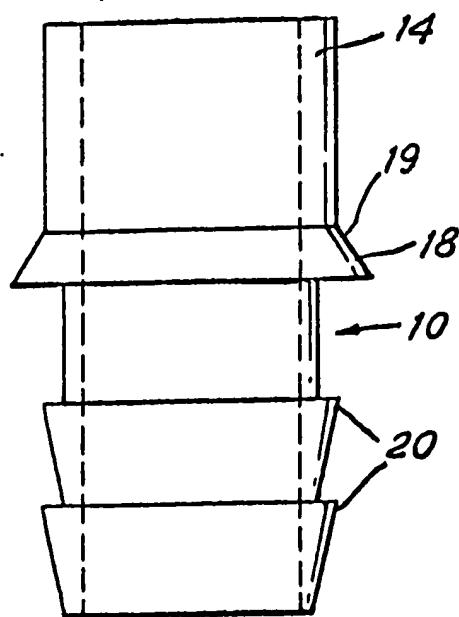


FIG. 1



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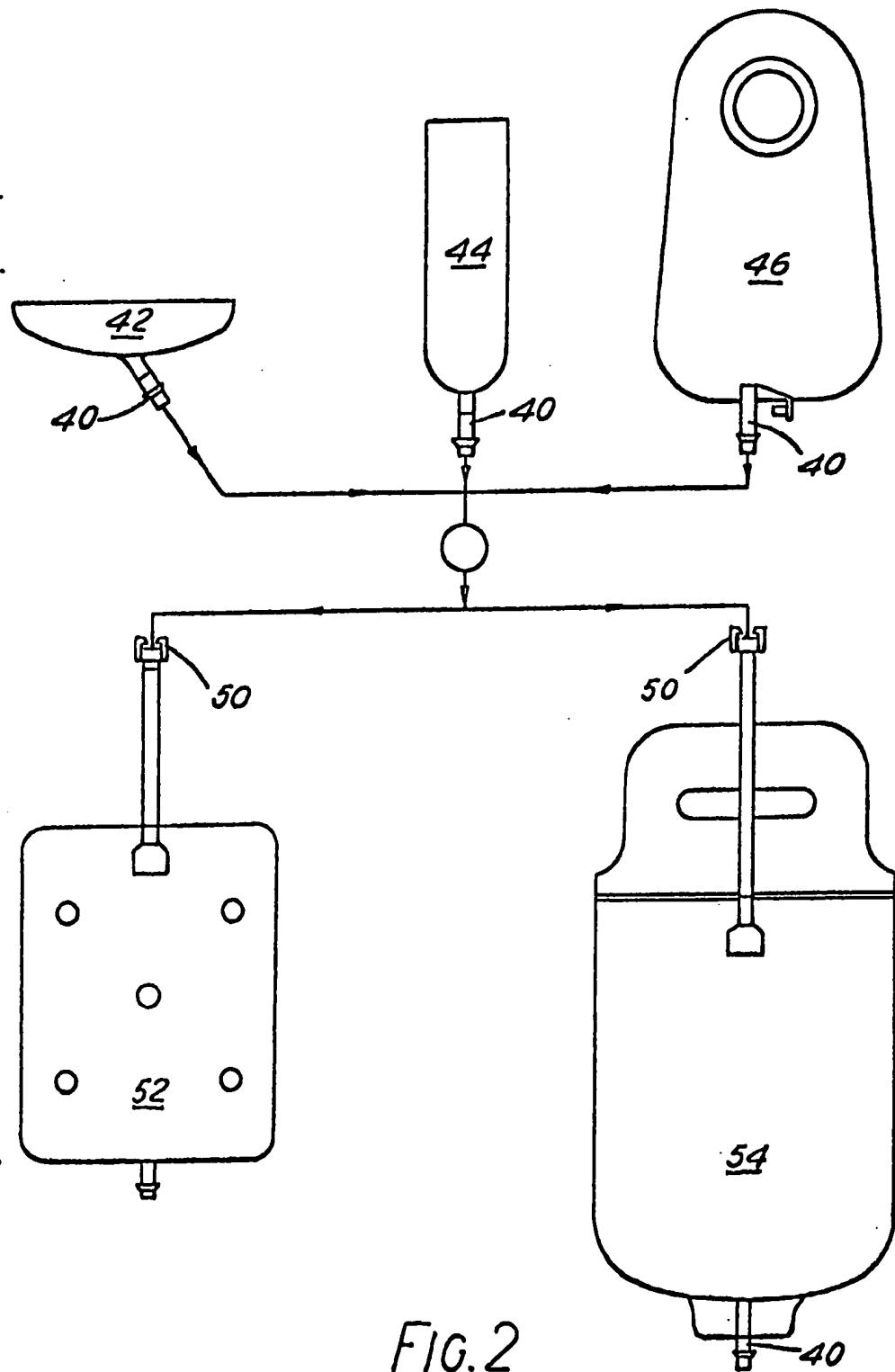


FIG.2

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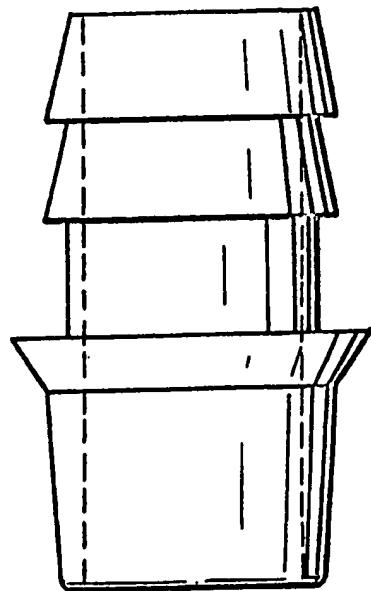
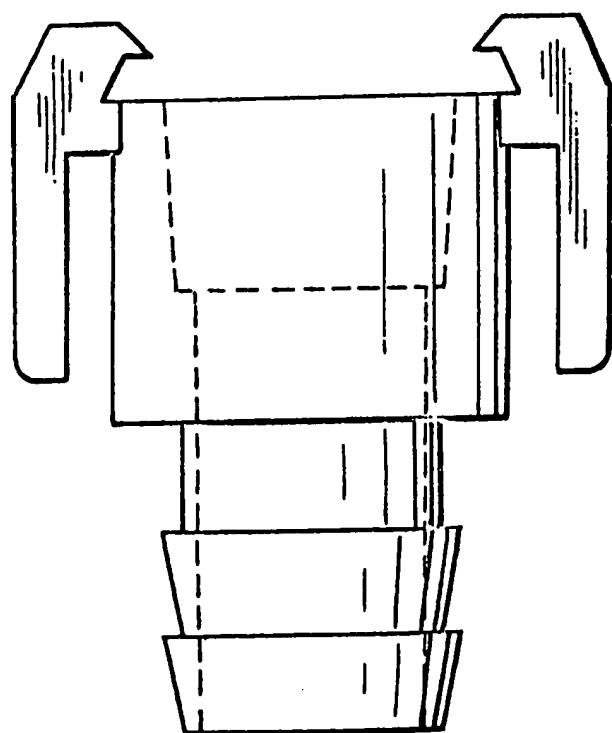


FIG. 3



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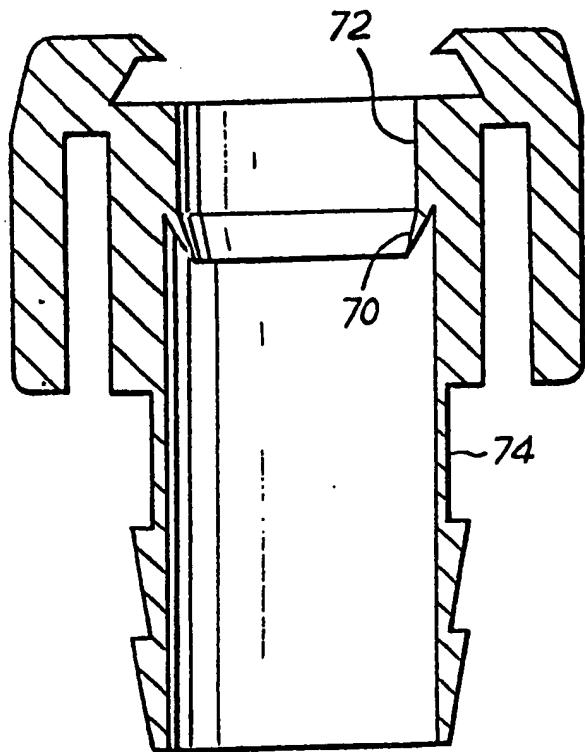


FIG. 4

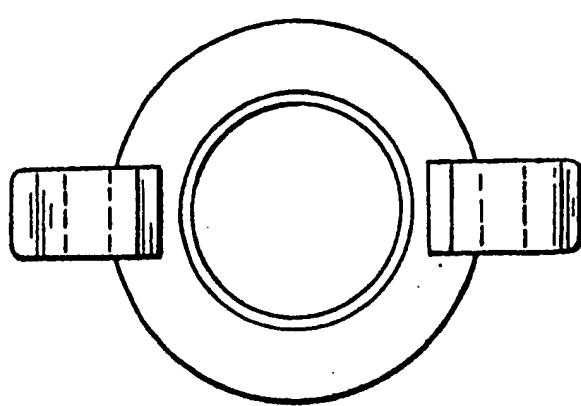


FIG. 4A

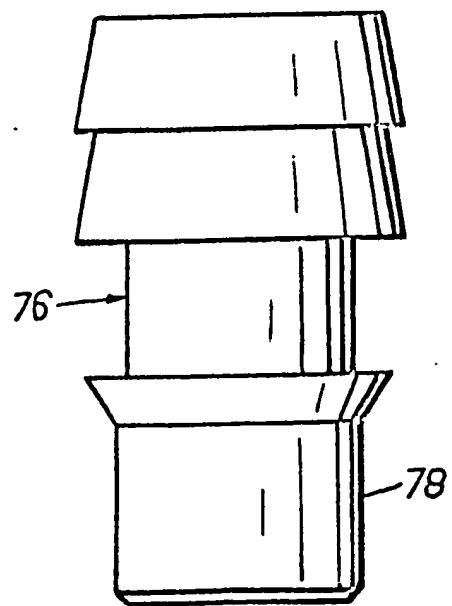


FIG. 5

SPECIFICATION  
A tube connector

This invention relates to a tube connector particularly though not exclusively useful for connecting medical and surgical equipment to other items of such equipment, and also relates to the individual elements of such a connector. For example the connector may be used to connect an ostomy bag to a drainage tube, or to connect an incontinence urine collection device to a drainage tube, or to connect a drainage tube to a drainage bag, or a catheter to a drainage tube. Other applications will occur to one skilled in the art.

A wide variety of tube connectors are known, but many are unsuitable for medical and surgical use because they lack simplicity and are expensive to manufacture.

According to one aspect of the invention, a tube connector consists of a male and a female element, each being moulded from synthetic plastics material and each having peripheral ridges or a plain cylindrical surface whereby each may be thrust into and retained in an open end of a tube by the gripping action of the ridges or by the friction of the cylindrical surface on the interior of the tube wall, the female element having a pair of springy catches at opposite ends of a diameter which are positioned and arranged to spring outwardly to allow entry of the male element and then spring inwardly to securely retain the male element in the female element by engagement of the catches with a radially projecting rim on the male element.

According to another aspect of the invention, there is provided a female element for a tube connector as aforesaid, the female element comprising a tubular body having at least two exterior ridges or a cylindrical surface for co-operation with an interior wall of a tube, a generally cylindrical recess for reception of a male connector element, and a pair of catches at opposite ends of a diameter, the catches being integral with the body and resiliently deformable outwardly to allow entry of the male connector element to the recess.

According to a further aspect of the invention, there is provided a male element for a tube connector as aforesaid, the male element comprising a tubular body having at least two exterior ridges or a cylindrical surface for co-operation with an interior wall of a tube, a generally cylindrical hollow spigot for insertion in a female connector element, and a rim on the exterior of the spigot for co-operation with a pair of catches on a female element.

The invention will be better understood from the following non-limiting description of an illustrative embodiment, given with reference to the accompanying drawing in which:-

60 *Figure 1* is an axial cross-section of one example of connector according to the invention, showing the male and female elements separated;

*Figure 2* is a schematic diagram illustrating possible applications of a connector according to

65 the invention;

*Figure 3* is a side elevation of a second example of connector according to the invention;

*Figure 4* is an axial cross section of a female element of a third example of connector according to the invention; and

*Figure 5* is a side elevation of a male element intended for use with the connector shown in *Figure 4*.

The connector illustrated in *Figure 1* consists of 75 a male element 10 and a female element 12. The former has a tubular body of which one end forms a spigot 14 for insertion in a recess 16 of the female element 12. A rim 18 extends radially outwardly around the periphery of the spigot 14. A 80 pair of ridges 20 (which are optional and may be omitted in certain designs of connector) are provided on the exterior of the body to facilitate a push fit insertion of the element 10 in the open end of a plastics tube which is to be connected by 85 the connector to another tube or an item of equipment.

The female element 12 has a body 24 containing the cylindrical recess 16, and carrying catches 26 which are located at opposite ends of 90 a diameter and which are integral with the body 24. Also integral therewith are two peripheral ridges 28 which co-operate with the interior wall of a tube or cylindrical recess to which the female connector is to be attached. Each catch 26 has a hook part 30 and an operating arm 32 and the construction thereof achieved by the moulding operation is such that pressure radially inwardly on the arms 32 causes the hook parts 30 to be moved radially outwardly to release the rim 18.

100 The rim 18 has an angled surface 19, and the hook parts have angled surfaces 31 to facilitate the user pushing the rim 19 past the surfaces 31, so temporarily deforming the catches 26, when joining the male and female elements.

The peripheral ridges 28 are not essential and may be omitted. In this case reliance is placed on the friction between a cylindrical outer surface of the female element 12 and the interior of a tube (or other item of equipment) to which it is connected, to hold the female element in place.

As illustrated, the recess has an annular base surface 17 which is perpendicular to the axis of the connector and the end of the spigot 14 comes into face-to-face engagement with the surface 17

115 when the two elements are joined. However, within the scope of the invention, to improve sealing in certain circumstances, it is possible to have a chamfered or angled annular surface 17 or to provide a tapering surface on the end of the spigot 14. In this way a wedging action occurs over the last portion of the spigot's entry movement into the recess. An example of this kind of arrangement is shown in *Figure 3*.

120 It will be seen that connection of this tube connector is very simply done by a simple push in an axial direction, and disconnection is also very simple; one merely grasps the element 12 and squeezes the arms together, and pulls the element 10 axially out of the element 12.

- The elements can be very readily moulded from plastics material, for example polyolefins, particularly polypropylene, nylons, and polyvinyl chloride.
- 5     Figure 2 is a schematic illustration of a male element 40 according to this invention attached to or forming part of a female incontinence collector device 42, a liquid supply bottle 44, and a urostomy urine collection bag 46. A female connector element 50 according to the invention is attached to a urine-collecting leg bag 52 and a night-drainage bag 54, the latter also having a male element 40. A connector according to the invention can be used to join any of the 5 illustrated items to tubing, or selected pairs of them to one another. This shows the variety of application of a connector according to the invention, and the simplicity of operation, together with the certainty that the male element on any of 15 the items 42, 44, and 46 will correctly fit the female element on the items 52 and 54, will prevent frustration of hospital staff and assist them to work efficiently.
- Figures 4 and 5 illustrate a quick release connector which is similar in essentials to that illustrated in Figure 1. In the connector shown in Figures 4 and 5, good sealing is achieved by the use of an annular deflectible skirt 70 which extends downwardly from a narrower bore portion 30 72 on the female coupling element 74. Figure 5 illustrates a male coupling element 76 which has a cylindrical spigot 78. When the two elements are joined, the spigot is pushed into the female element 74 and forces the skirt 70 slightly outwardly. As an example, the O.D. of the spigot 78 may be 0.335 inch, the I.D. of the narrow bore cylindrical portion 72 of the female element 74 may be 0.340 inch, and the minimum I.D. of the skirt may be 0.330 inch. The male and female elements may be moulded from polypropylene. Figure 4A is a view in an axial direction of the element shown in Figure 4.

#### CLAIMS

1. A tube connector consists of a male and a female element, each being moulded from synthetic plastics material and each having

- peripheral ridges or a plain cylindrical surface whereby each may be thrust into and retained in an open end of a tube by the gripping action of the ridges or by the friction of the cylindrical surface on the interior of the tube wall, the female element having a pair of springy catches at opposite ends of a diameter which are positioned and arranged to spring outwardly to allow entry of the male element and then spring inwardly to securely retain the male element in the female element by engagement of the catches with a radially projecting rim on the male element.
2. A female element for a tube connector, the female element comprising a tubular body having at least two exterior ridges or a cylindrical surface for co-operation with an interior wall of a tube, a generally cylindrical recess for reception of a male connector element, and a pair of catches at opposite ends of a diameter, the catches being integral with the body and resiliently deformable outwardly to allow entry of the male connector element to the recess.
3. A male element for a tube connector as aforesaid, the male element comprising a tubular body having at least two exterior ridges or a cylindrical surface for co-operation with an interior wall of a tube, a generally cylindrical hollow spigot for insertion in a female connector element, and a rim on the exterior of the spigot for co-operation with a pair of catches on a female element.
4. A tube connector according to claim 1 or an element according to claim 2 in which the springy catches have angled surfaces so that the catches can readily be pushed apart.
5. A tube connector according to claim 1 or an element according to claim 3 in which the spigot has a chamfered end.
6. A tube connector substantially according to Figure 1 of the accompanying drawings.
7. A female element for a tube connector according to claim 2 in which the tubular body has an internal deflectible annular sealing skirt therein.
8. A tube connector including a female element according to claim 7.
9. A combination including an incontinence device, a collection bag, tubes connected to each, and a connector according to claim 1, 4, 5 or 6.